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A New Genus and Species of Extraordinary Cave Trechine (Coleoptera, Trechinae) from Eastern Yunnan, Southwest China

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Abstract A very peculiar cave species of trechine beetle with *Odontium*-like body and aphaenopsoid head and appendages is described from a limestone cave near the Shilin Karst Park in eastern Yunnan, Southwest China, under the name *Shilinotrechus fusiformis* gen. et sp. nov. Its true affinity is not certain, but it may have a remote relationship to *Oodinotrechus* S. Uéno from southeastern Guizhou.

Near the end of 2001, a very strange cave beetle was discovered by Li Dao Hong in a limestone cave near the famous Shilin Karst Park at the eastern part of Yunnan, Southwest China. The specimen was entrusted to Jingcheng Ran for study, and then came to my hands (cf. Uéno & Ran, 2002, p. 42). Unfortunately, its head was badly crushed and almost split up into two lateral portions. Judged from what remained, however, I concluded that the beetle must be a trechine species belonging to a group theretofore unknown to us.

In view of the importance of the discovery, I flew to Yunnan in the middle of the autumn, 2002, for seeking perfect specimens of the beetle, and succeeded in obtaining adequate material. It was clarified from a careful study of these fresh specimens that though extraordinary in facies and many morphological features, the trechine beetle could be regarded as a very peculiar offshoot of the *Guizhaphaenops–Cathaiaphaenops* group, whose members are widely distributed to the caves in the Yungui Highlands and their continuations. It is not directly related to any genera hitherto described, but may have a remote relationship to *Oodinotrechus* S. Uéno (1998, p. 38), another genus of strange-looking cave trechines known from southeastern Guizhou.

In the present paper, I am going to describe the Yunnanese species under the name of *Shilinotrechus fusiformis* gen. et sp. nov. The abbreviations used herein are the same as those explained in previous papers of mine.

Before going further, I wish to express my heartfelt thanks to Messrs. Jingcheng Ran and Li Dao Hong for giving me the opportunity to study the very interesting beetle, and to Messrs. Fan Ting and Chen Jin Hui of the Academia Sinica for arranging and assisting my investigation of Shilin caves.

Genus *Shilinotrechus* S. UÉNO, nov.

Type species: *Shilinotrechus fusiformis* S. UÉNO, sp. nov.

Diagnosis. A medium-sized trechine beetle of uncertain affinity, recognized at first sight on its unique fusiform facies widest at the humeral parts of elytra and narrowed in front and behind; head aphaenopsoid, with frontal furrows deep and subparallel in front and obsolete posteriorly; prothorax widest at the base and directly narrowed from there towards the apex, with the lobed base perfectly fitting to the sharply edged bases of elytra, which are widest at the humeral parts and gradually narrowed towards pointed apices; venter of thoraces strongly compressed on the median line and forming a high ridge, particularly in mesosternum; male genitalia dorso-ventrally flattened, with apical orifice adaxial, and with parameral articulations widely separated from each other.

Description. Body fusiform, widest and highest at the level of humeral parts of elytra, narrowed and thinned in front and behind, and with long antennae and legs, the latter of which are very slender; apterous, depigmented and anophthalmic; surface seemingly glabrous, though very sparsely covered with minute hairs; microsculpture sharply impressed throughout, mostly consisting of isodiametric or polygonal meshes. Colour light reddish brown, shiny; palpi, apical halves of antennae, venter of hind body, and legs more or less lighter than dorsum, usually yellowish brown.

Head fairly large, subquadrate, with frontal furrows straight and deeply impressed in apical two-thirds, subparallel or slightly divergent anteriad, but mal-defined and obsolete posteriorly; eyes completely absent; genae feebly convex, sparsely covered with short hairs; dorsum practically glabrous, with two pair of supraorbital setae on lines divergent anteriorly; neck very wide, with the anterior constriction shallow though distinct; labrum semicordate, with the apical margin deeply notched at the middle and rounded at each lateral corner. Mandibles long, sharply falcate and tridentate, the teeth being sharp on right mandible. Mentum fused with submentum, deeply concave on each side, mental tooth broad, with the tip emarginate and slightly bifid; submentum provided with a transverse row of 10 setae; ligula subpentagonal, with porrect apex bearing two long setae, each oblique lateral part bearing three shorter setae; labial palpus slender, penultimate segment long, lightly arcuate, gradually dilated towards apex, quadrisetose, and also bearing several minute hairs, apical segment five-sevenths as long as the penultimate and gradually tapered towards the blunt tip. Maxillae only feebly curved except for apical portions of lacinia and galea; maxillary palpus with penultimate segment externally dilated towards apex and scattered with short hairs beside a short seta at the external corner of apex, apical segment five-sixths as long as the penultimate and elongated subconical. Antennae fairly long, filiform, pedicel as long as antennomere 10, a little shorter than scape and distinctly shorter than antennomere 3, antennomere 5 the longest, 6–10 gradually decreasing in length towards apex, 11 about as long as 7 and obviously longer than scape.

Pronotum small, subtrapezoidal, usually somewhat longer than head but some-

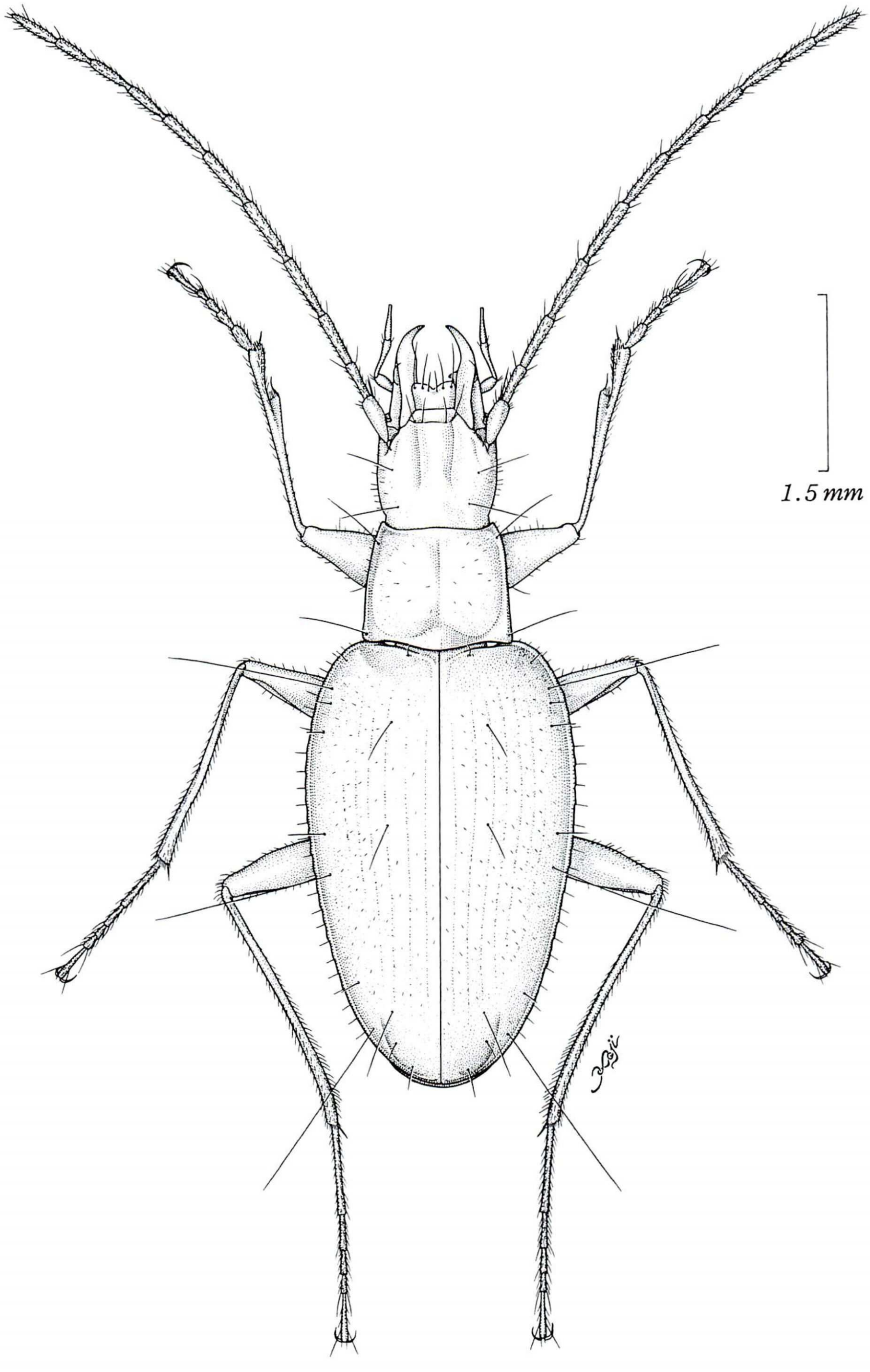


Fig. 1. *Shilinotrechus fusiformis* S. UÉNO, gen. et sp. nov., ♂, from Dagan Dong Cave in Shilin Xian, eastern Yunnan.

times as long as the latter, widest at the base, and gradually narrowed towards apex; sides slightly arcuate only near front angles, narrowly bordered except near four corners, where the borders are more or less widened and reflexed, and sparsely fringed with very minute hairs, particularly in apical halves, with two pair of marginal setae, of which the anterior one is just behind front angle and the posterior nearly on hind angle; apex either straight or slightly bisinuate, with front angles small but porrect; base briefly lobed at the median part and widely emarginate on each side, with the postangular portion slightly produced posteriad; hind angles blunt at the tips; dorsum gently convex, sparsely scattered with minute hairs; median line clearly impressed though reaching neither apex nor base; apical transverse impression vague, somewhat uneven, basal transverse impression subangulate at the middle, posteriorly arcuate on each side, and laterally extending to hind angle; no appreciable basal foveae; basal area fairly wide at middle but becoming narrower in lateral parts. Scutellum invisible from above.

Elytra elongated cordate and convex, much wider and longer than fore body, widest at about basal two-sevenths and gradually narrowed towards apices, which are unusually narrowly and conjointly rounded; shoulders evanescent, prehumeral borders curving round inwards and then backwards, abruptly diminishing from the anteriormost points and obsolete before reaching basal peduncle; sides moderately bordered in anterior halves but becoming narrower posteriad, lightly arcuate in basal third, then nearly straight to near the level of the apicalmost umbilicate pore of the marginal series; no appreciable preapical emargination; marginal serration almost invisible, though the margins are sparsely fringed with a row of short hairs; dorsum sparsely covered with minute hairs, being separated from basal peduncle by a transverse edge or carina continuing inwardly from the site of the base of stria 5 to near suture, a ventro-internally curved furrow present between prehumeral border and the outermost portion of the carina for receiving the protuberant postangular portion of pronotum; basal areas obliquely depressed transversely and semiellipsoidally; striae superficial, finely punctate, all evanescent in depressed basal area, outer striae obsolete and only indicated by rows of fine punctures, stria 8 completely absent; scutellar striole mal-defined; apical striole deeply impressed, not much curved, nearly straight anteriad and directed to the site of stria 5; intervals completely flat, apical carina sharp; stria 3 with two setiferous dorsal pores before middle; preapical pore located near the terminus of apical striole at the apical anastomosis of striae 3 and 4 or on its site, and much more distant from apex than from suture; two apical pores present as usual. Marginal umbilicate pores irregular and not aggregated; pore 1 of the humeral set widely isolated from the other three, pore 3 close to 2 but pore 4 is a little more distant; pores of the middle and apical sets ordinary in arrangement though moderately distant from marginal gutter except for pore 8.

Ventral surface pubescent at the median parts; thoracic sterna compressed on the median line, forming a high ridge, which is connected between pro- and mesosterna by an elongated prosternal process whose apex fits to a round concavity on the ridge in the centre of mesosternum; visible sternites 3–5 each usually with a pair of paramedian setae, a second seta rather frequently present on one side, sometimes on both sides; anal sternite provided with a pair of marginal setae in ♂, with two pairs in ♀. Legs long and slender, tibiae and tarsi particularly thin; protibiae straight, moderately dilated towards apices, wholly pubescent, and devoid of longitudinal groove on the external face; metatibia about three-fifths as long as elytra, more or less outcurved in apical part; tarsomere 1 longer than tarsomeres 2–4 combined in meso- and metatarsi; in ♂, only one proximal segment of each protarsus slightly dilated, minutely angulate (but neither spurred nor tuberculate) at the internal corner of apex, and usually with one or two vestiges of adhesive appendages beneath.

Male genital organ very small and lightly sclerotized; aedeagus dorso-ventrally flattened, gently twisted, widely membraneous on dorsum, nearly straight in apical three-fifths, and moderately curved ventrad at the basal part; basal orifice large and asymmetrical; sagittal aileron fairly large, round, and heavily sclerotized; apical orifice adaxial, opening apically above short apical lobe, which appears tuberculate in dorsal view but is simply rounded in lateral view; inner sac armed with a large anisotopic copulatory piece, whose apical part forms an elongate lobe protrudent from apical orifice; styles narrow, widely separated from each other at the basal articulations, left style longer and narrower than the right and completely devoid of ventral apophysis, each bearing two short setae at the apex and two shorter setae a short distance before the terminal ones.

Range. Known so far from only a limestone cave lying at the eastern part of Yunnan, Southwest China.

Notes. It is most probable that the description given above includes specific characteristics beside proper generic ones, but it is difficult to discriminate them at the present moment due to the extreme aberrancy of the new species. A revision of the generic account is therefore necessary when other congeners are discovered in the future. The description of the new species given on later pages deals mainly with quantitative data that are doubtless characteristic of the species.

As was noted in the introduction, this remarkable new genus seems to belong to the group of *Guizhaphaenops* in a broad sense in spite of its extraordinary facies and other peculiarities. Its buccal appendages are similar to those of *Guizhaphaenops*, with the exception of mandibles which are tridentate instead of being bidentate, and the male protarsus has only one modified segment, though the modification is much less pronounced than in *Guizhaphaenops*. The dorsal chaetotaxy of *Shilinotrechus* is considerably different from that of *Guizhaphaenops* (s. str.) (cf. UÉNO, 2000), but it is not so strikingly different from that of *Guiaphaenops* DEUVE (2002, p. 516), which is regarded by its author as a subgenus of *Guizhaphaenops*, with the exception of the arrangement of the four pores of the humeral set of marginal umbilicate series. The type species of *Guiaphaenops, G.* (*G.*) *lingyunensis* DEUVE (2002, p. 518, figs. 1–2) from northwestern Guangxi, somewhat resembles *Shilinotrechus fusiformis*, above all in the peculiar configuration of the elytra, but the articulation of the prothorax and elytra is not peculiarly modified in *Guiaphaenops*, the head and prothorax are much narrower and longer in *Guiaphaenops* than in *Shilinotrechus*, and the prothoracic base is not so broad in the former as in the latter.

Though utterly different in facies, *Shilinotrechus* may have a remote relationship to *Oodinotrechus* S. UÉNO (1998, p. 38) from southeastern Guizhou, which contains at least four distinctive species (UÉNO, unpubl.). Though not perfectly identical, the peculiar articulation of the prothorax and elytra is found in *Oodinotrechus*, and the two genera also share similar dentition of mandibles, similar dorsal chaetotaxy except for the arrangement of the humeral umbilicate pores, and so on. Besides, the known members of these genera are cursorial in nature like advanced aphaenopsoid trechines, and usually run about on wet soft mud deposited by floods of underground streams. It is possible that the bionomical similarity of the two genera may have been brought about by ecological convergence, but I cannot help considering that they have become independently specialized from ancestral trechines belonging to the *Guizhaphaenops* complex.

Shilinotrechus fusiformis S. UÉNO, sp. nov.

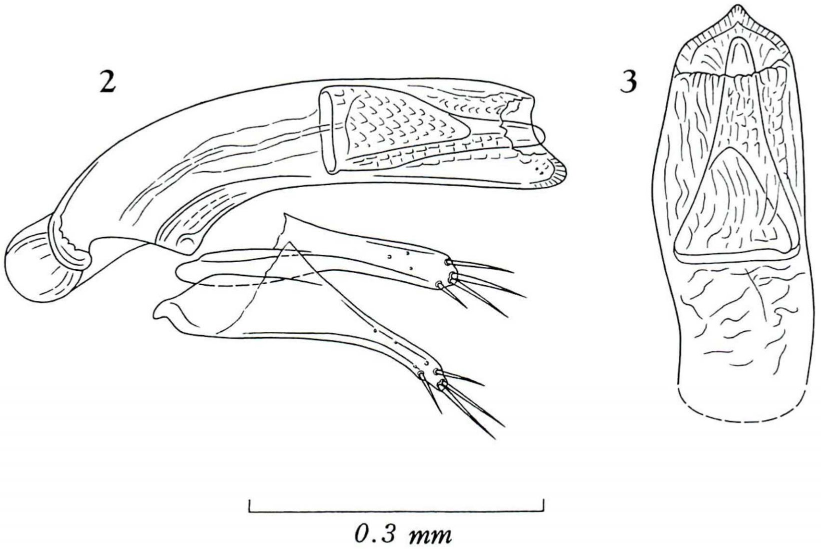
(Figs. 1–3)

Length: 4.80–6.00 mm (from apical margin of clypeus to apices of elytra); 5.45–6.80 mm (including mandibles).

Facies, coloration, pubescence and microsculpture as described under the genus. Head aphaenopsoid though not elongated, usually a little shorter than pronotum and slightly wider than long, HW/HL 0.95–1.12 (M 1.04), always a little wider than pronotal apex, HW/PA 1.08–1.14 (M 1.10), with genae feebly and evenly convex; frons gently convex, supraorbital areas rather flat; antennae slender, reaching apical fourth of elytra, antennomere 5 about 6 times as long as wide, antennomere 10 fully 3.5 times as long as wide.

Pronotum subtrapezoidal, wider than head, wider than long, widest at the base, and gradually narrowed towards apex; PW(=PB)/HW 1.20–1.33 (M 1.27), PW(=PB)/PL 1.16–1.30 (M 1.24), PW(=PB)/PA 1.36–1.46 (M 1.41); sides almost invisibly arcuate or straight for the most part and slightly arcuate in apical sixth before the level of anterior marginal setae; front angles small but produced forwards and pointed at the tips; base narrowly reflexed except for small postangular portions.

Elytra elongated cordate, much wider than pronotum, evidently longer than wide, widest at 1/4–3/10 (usually at about 2/7) from bases, and more gradually narrowed towards apices than towards bases; EW/PW(=PB) 1.73–1.85 (M 1.79), EL/EW 1.59–1.65 (M 1.62); shoulders not clearly marked, moderately arcuate together with prehumeral borders; sides nearly straight in median third, and lightly arcuate in front and behind; dorsum convex, especially in basal two-fifths, longitudinally depressed on the disc in apical three-fifths, steeply declivous in marginal areas, particularly at the sides, and rather gently slanting in depressed basal areas; stria 3 with two setiferous dorsal



Figs. 2–3. Male genitalia of *Shilinotrechus fusiformis* S. UÉNO, gen. et sp. nov., from Dagan Dong Cave in Shilin Xian, eastern Yunnan; left lateral view (2), and apical part of aedeagus, dorso-apical view (3).

pores at 2/11–2/9 (usually 1/5) and 2/5–4/9 (usually 3/7) from base, respectively; preapical pore very closely located to the terminus of apical striole, more than 1.5 times more apart from apex than from suture.

Ventral surface as described under the genus. Legs long and slender as described under the genus; protarsomere 1 in ♂ sometimes devoid of the vestiges of adhesive appendages on the ventral side, but always slightly broader than in ♀.

Aedeagus very small, only one-sixth as long as elytra, broad in dorsal view, low and nearly parallel-sided in lateral view; apical part wide at the level of apical orifice and abruptly narrowed towards bluntly tuberculate tip in dorsal view, vertically emarginate at the sides of apical orifice and produced into a short apical lobe rather widely rounded at the extremity in lateral view. Copulatory piece large, about three-sevenths as long as aedeagus, wide and doubled on the left side in proximal half, rapidly narrowed apicad, and produced into an elongate apical lobe narrowly rounded at the tip; surface largely covered with minute scales. Styles as described under the genus.

Type series. Holotype: ♂, allotype: ♀, 18–X–2002, S. UÉNO leg. Paratypes: 2♂♂, 18–X–2002, S. UÉNO leg.; 6♂♂, 3♀♀, 19–X–2002, S. UÉNO leg. All deposited in the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Limestone cave called Dagan Dong, 1,730 m in altitude, at Suobusuo Cun of Lumeiyi Xiang in Shilin Xian, eastern Yunnan, Southwest China.

Further specimen examined. 1♀ (with crushed head), same locality as the type series, 19–XII–2001, LI Dao Hong leg. (NSMT).

Notes. This remarkable new species has so far been known from a limestone cave, called Dagan Dong, located at about 7 km north-northwest of the Shilin Karst Park. Caves in the Shilin area were examined by myself in the 1990's and again in the last autumn, but no cave trechine was turned up from any other caves investigated.

Dagan Dong Cave lies in a valley carved by a stream debouched from the water cave called Zhankou Dong. Its existence is known to local people, but only a few farmers can pinpoint its exact location, since its small vertical entrance is open among lapies on a steep slope of the left side of the valley and is concealed by thick growths of Oriental pampas grass. From the bottom of a 2 m drop, the cave slants down for a short distance to the main passage, which slopes slightly downwards. A narrow muddy groove extends from near the bottom of the first drop to the innermost, meandering here and there but mostly continuing along the left-side wall. This groove seems to turn into a stream on rainy days, as its bottom is covered with wet soft mud, above all in the inner half of the cave. *Shilinotrechus* lives on this soft mud, usually crawling about and sometimes resting in the shade of stones. It was met from near the entrance but was mostly found near the squeeze at the innermost of the cave. The air temperature at the inner collecting site was 19°C on October 19, 2002.

要約

上野俊一：云南東部で発見された異常な形態の洞窟性チビゴミムシ．—— 中国云南省の東部，石林彝族自治县北西部の路美邑乡にある大干洞という石灰洞から，チビゴミムシの一種とは思えないほど異常な体形の真洞窟種を新属新種として記載し，これに *Shilinotrechus fusiformis* S. UÉNO という新名を与えた．真の類縁関係はかならずしも分明でないが，口器の構造、体背面の剛毛式，雄前付節の二次性徴などを総合して考えると，云贵高原の洞窟に広く分布する *Guizhaphaenops* ないしはその近縁属の祖先種のなかから特殊化して，いちじるしい分化を遂げたものであるように思われる．贵州省南東部に分布する *Oodinotrechua* 属の種と同じように，地下の洪水のあとに時間をかけて堆積した軟泥のうえを走りまわって生活しているが，これが真の系統関係を表わすものかどうかはよくわからない．いずれにしても，これら 2 属の特異なチビゴミムシ類は，云贵高原の東端部と西端部でそれぞれ独自に進化してきたものだろう．

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